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ABSTRACT

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Total Awareness: Reducing the Severity of Reading Disability

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Abstract

The goal of this study was to describe and measure the effects of continuous, as-needed intervention in reading for 92 children in Grades 1-2, to determine whether the severity of reading disability (RD) could be significantly reduced in the catchment schools. We hoped that this kind of professional development would help to discriminate between children with true RD and children whose difficulties were caused by more easily remediated phonological awareness problems or limited exposure to reading activities prior to school entry. In this study the second grade teachers formed their own control, because their children were measured in the first year of the study, when second grade was not included, and also in the following year, when their children were full participants in the treatment. A comparison of the reading achievement of second grade children in Years 1 and 2 showed significant differences favoring children in the treated years in decoding, word identification, fluency, and reading comprehension.

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Intervention research with children at risk for reading disability (RD)--as determined by poorly developed literacy in kindergarten and first grade--reports positive effects for children in kindergarten (Blachman, Ball, Black, & Tangel, 1994; O'Connor, Jenkins, & Slocum, 1995; Torgesen et al., 1997) and first grade (Clay, 1985; Foorman et al., 1998; Slavin, Madden, Dolan, & Wasik, 1996; Vellutino et al., 1996). However, most early reading intervention programs have excluded children with disabilities (Byrne & Fielding-Barnsley, 1993; Hatcher, Hulme, & Ellis, 1994; Vellutino et al., 1996), even though converging evidence suggests that children with RD may need phonological awareness instruction for reading acquisition (Hatcher et al., 1994; O'Connor, Notari-Syverson, & Vadasy, 1996). Explicitly teaching phonological awareness in conjunction with early reading skills to children with RD may help them to understand the alphabetic principle, which could provide stronger motivation for learning sound/symbol associations and decoding, thus enabling more advanced reading skills (Gough & Walsh, 1991; Shankweiler, et al., 1999).

This body of evidence has led some researchers to recommend early intervention to stimulate the phonological understandings of children prior to and alongside reading instruction (Snow, Burns, & Griffin, 1998). Experiments that have attempted this task have yielded superior results over control conditions (Bus, & IJzendoorn, 1999; National Reading Panel, 2000), however, questions remain that inhibit accurate estimates of the effects of whole school efforts in early intervention. In particular, the effects of long-term early intervention on the poorest readers are not well understood. The National Reading Panel Report (2000) found few studies extending beyond one school year, despite the tenacity of many reading difficulties. Appropriate control groups for longitudinal studies can also be problematic, when researchers work in public schools that discourage random assignment to treatments.

Complex, Long-term Interventions

According to Wagner and colleagues (1997), early screening of phonological awareness to identify children who may develop RD is supported by the existence of stable individual differences in phonological language ability that influence the acquisition of reading skills. Although effective for many, intervention based on phonological awareness is insufficient for some children, and researchers are exploring longer, more complex interventions for children who appear most at risk for reading disability (Blachman, Tangel, Ball, Black, & McGraw, 1999; O'Connor, 2000). One feature of these complex interventions is professional development.

Darling-Hammond (1997) reported that effective professional development should include modeling intended behaviors, discussing implementation issues, planning for adopting new strategies, ongoing feedback on observed instructional changes, and changes in student outcomes. She determined that the most effective staff support for experienced teachers would be curriculum based, sustained over time, linked to concrete tasks and problems of practice, and informed by research. In their study of sustaining improved practice over time, Gersten, Chard, and Baker (2000) found that "practices that helped teachers succeed with low-achieving students promoted the continued use of those practices." (p. 446)

The current study combines features found to be successful in previous studies: professional development for teachers, monitoring children's reading progress, reporting scores back to teachers, and consistent long-term reading intervention across Grades 1 and 2 for children who fall behind (Blachman et al., 1999; Good, Simmons, & Kame'enui, in press; O'Connor, 2000; Torgesen et al., 1999). Our intent was to explore whole school efforts to decrease the severity of reading problems, in which no children were excluded from layers of intervention that appeared helpful, based on their reading scores.

The overall goal was to increase the reading performance of children with reading difficulties in the primary grades. Our objectives across 2 years were to: (1) increase the capacity of general and special education teachers to conduct instruction that stimulates reading acquisition; (2) repeatedly measure the literacy performance of children with disabilities, or at risk for developing disabilities across Grades 1-2 to determine the progress of children receiving this instruction; (3) provide additional intervention beyond the classroom teachers' efforts to children who perform below average on these measures; and (4)

compare the literacy levels and rates of placement in special education of children in the participating schools to literacy levels and placement rates prior to the two years of intervention.

Method

Participants

Our participants included all children in Grades 1 and 2 (92 first graders and 89 second graders) in the two schools described below, whether served in general or special education. The principals of both schools and all of the general, remedial, and special education teachers, along with their teaching assistants, agreed to participate. In the first year, children in Grade 1 were the experimental group, and those in Grade 2 formed the control group.

School 1 is located in an industrial area of a city in the NE that draws from very low SES and middle income communities. Fewer than 10% of the parents report any college education. Ethnicity statistics report 12% African American, 11% Hispanic, 9% Native American, 68% Caucasian. This school employs two full-time special educators, who work primarily with children who have learning disability (LD), mild mental retardation (MR), and emotional disturbance (SED), along with two full-time Title 1 teachers who assist children in inclusive classes, as well as provide pull-out small group reading instruction. From 1996-1998, 15% of the school population received special education services.

School 2 is a university affiliated laboratory school located in an urban environment. Many of the children's parents are highly educated and most pay tuition for their children to attend, although 12% are supported through tuition aid. Ethnicity statistics report 15% African American, 57% Caucasian, and 28% Other. In1998, a remedial reading specialist provided services in reading to 18% of children in the primary grades.

Measures

Measures collected from experimental children. In October, February, and May of Grades 1 and 2, we administered three subtests of the Woodcock Reading Mastery Tests-Revised/NU (WRMT-R/NU, 1998) to assess reading progress: Word Identification , Word Attack, and Passage Comprehension. We collected oral reading fluency individually using a different primer level passage at each testing point for first graders, and different second grade passages at each time for the second graders. At the beginning of Grade 1 and end of Grade 2, we administered the PPVT-R to assess receptive vocabulary.

During the pretest battery for first grade, we also administered a test of blending and segmenting (O'Connor & Jenkins, 1999), and assessed children's knowledge of letter names. We continued to measure these prereading skills until children neared the test ceilings.

Descriptive measures collected at the end of Grade 2. The Peabody Picture Vocabulary Test-Third Edition (PPVT-III; Dunn, Dunn, & Dunn, 1997) is a norm-referenced test of receptive vocabulary. Each item consists of four black-and-white drawings arranged on a page. Participants were asked to identify, either by pointing or by saying the number that corresponds to the drawing, which of the four illustrations best represented the stimulus word presented orally by the examiner. Reliability (internal consistency) using coefficient alpha for students between the ages of 7 and 11 ranged from .95 to .96, with split-half reliability between .92 and .96.

Measures collected from control children. In May of the first year of this research, we administered the WRMT-R/NU subtests, oral reading fluency on Grade 2 text, and the PPVT-R to all second grade children in the two experimental schools. These children had not participated in the treatment described below.

Narrative observations of reading instruction. At the end of Year 1, participating teachers were interviewed about their instructional practices and changes implemented as a result of professional development activities described later. In Year 2, narrative observations in 9 classrooms were conducted to examine the implementation of these practices. These observations were designed to obtain a composite picture of student and teacher activities during reading instruction by recording classroom events as they occurred. Observers described teacher behavior, student engagement, and lesson content in a chronological format. Extensive on-going field notes taken by an observer during reading instruction described how the teacher delivered instruction, usage of materials, grouping of students, interactions

between students and teachers, and level of engagement of students with low reading scores. The process of gathering narrative field notes involved recording information by making entries at 5-minute intervals.

Layers of Intervention

The National Academy of Science has endorsed greater emphasis on interventions for children with disabilities in general education prior to referral (Gottlieb, Alter, Gottlieb, & Wisher, 1994; Reschly, 1984). This emphasis suggests a need for professional development of school personnel who work with struggling readers. In the current study, we provided professional development for teachers and subsequent intervention for children with low reading skills (> .6 standard deviation below average on the WRMT-R).

Layer 1: Professional development. The first layer of intervention in Grade 1 provided teachers, teaching assistants, and administration with three days of research-based strategies for promoting reading acquisition. In early September, content included stimulating the acquisition of phonological blending and segmenting, letter names and sounds, and the alphabetic principle (Ball & Blachman, 1991; Hatcher, Hulme, & Ellis, 1994). In December we included strategies for phonics instruction (letter sounds and orthographic patterns), identifying and using decodable and patterned text, and spelling (Carnine, Silbert, & Kameenui, 1997; Foorman, Francis, Novy, & Liberman, 1997; Iverson & Tunmer, 1993; O'Connor & Jenkins, 1995). In March, we demonstrated strategies that promote oral reading fluency and reading comprehension, such as repeated reading, partner reading, story grammar, and story retelling (Baumann & Bergeron, 1993; Dowhower, 1987; 1994; Mathes & Fuchs, 1993; Sindelar, Monda, & O'Shea, 1990).

For each of these sessions, we provided theory that supported the development of the strategy, findings from research studies, models of teaching, and materials for teachers to try in their classrooms. The afternoons were devoted to discussions among the teachers across both schools and the research team, timelines for implementation, and schedules for coaching, data collection, and data sharing. We provided ongoing support to school personnel through seven additional meetings at each of the schools, in which we discussed the children's progress and how additional intervention could be orchestrated for the children making poor progress in literacy in first grade. In the weeks between inservice, we observed teachers to provide feedback and instructional support for making modifications for individual children. These short sessions allowed unstructured time for questions, feedback, and discussion of children's progress.

In the second year, we provided professional development for second grade teachers. The first all-day session reviewed the inservice content of the Grade 1 teachers, and extended strategies for developing word recognition and reading fluency (Carnine et al., 1997; Reutzel & Hollingsworth, 1993; Simmons, Fuchs, Fuchs, Mathes, & Hodge, 1995). During the last two days of professional development (in December and March), we demonstrated linkages among reading fluency, accuracy, and comprehension (Durkin, 1993; Pressley, 1998; Shankweiler et al., 1999), and emphasized word analysis and comprehension strategies.

Layer 2. Measures collected in October and February, and late in May each year allowed us to determine individual responses to the least invasive layer of treatment—improved instruction on the part of their teachers. In the first year, we found 14 first graders (3 eligible for special services under the categories of LD, PDD, or MMR) with serious rate-of-acquisition problems, despite strong instructional routines in general reading classes. In late October, research personnel began providing instruction to these children in small groups of 2 or 3, for 25-30 minutes, 3 times per week, in which reading activities were scaffolded to increase participation levels, response accuracy, retention of reading skills, and appropriate application to reading and writing tasks demands (e.g., used smaller instructional sets and easier levels of tasks; provided more repetition to develop key concepts and more oral reading opportunity). We used cumulative introduction to review short vowel sounds, and supplemented classroom materials with sentences composed of decodable words.

We continued these activities for first grade children and teachers in Year 2, and added professional development for the second grade teachers who had served as controls the year before. We measured the progress of children on the same schedule, and provided additional small group instruction to second grade children who continued to need it from Year 1 (9 children) along with 2 from Year 1 who

had not been served the year before, and 3 children who moved into the catchment schools as new second graders.

Some children in small groups spent roughly half of the time on word patterns, decoding, and spelling, followed by reading aloud in text containing those patterns. Other groups of children had skills near grade level, but very slow reading rate. These children spent most of their small group time reading and rereading text written at second grade level to build fluency and comprehension. Across the two schools, we found no children with grade appropriate decoding and fluency, but poor comprehension.

Tutoring records and observations. Tutors of children in Layer 2 recorded tutoring content and attendance for each session, and collected oral reading fluency data every other week. The tutors remained stable across the two years, and consisted primarily of graduate students and research associates in special education. In the first two months of tutoring, the authors observed each tutor two to four times. Thereafter, lessons were audiotaped monthly. When progress data indicated a low rate of growth for a particular student, the first author assumed a tutoring or observer role to identify instructional features to adjust. These adjustments occurred for approximately one-third of the students across the two years of the study.

Results

Teacher Implementation of Strategies from Professional Development

During interviews first grade teachers identified several changes in their practice--specifically more emphasis on letter sounds than letter names, decoding instruction for all children in the first half of the year, forming two or three reading groups, the introduction of alternative reading materials (more controlled vocabulary) for lower skilled students, and encouraging children to stretch sounds when blending and segment sounds when spelling words. Virtually all teachers in School 1 mentioned the difficulty they had had in the previous year relying on the new district-adopted text, which they perceived as too difficult for many of their children. Teachers in School 2 reported fewer changes in their daily practice (these teachers already grouped for instruction because of the multi-age class structure), but mentioned an increased repertoire of strategies for children in their lowest group.

We wanted to know the extent to which teachers actually used the methods they talked about in a typical day's reading instruction, and so we conducted structured observations in Year 2. Field note records from these observations were transcribed and formatted according to *QSR NUD*IST* (Non-Numeric, Unstructured, Data, Indexing, Searching, and Theory Building, 1997) guidelines so that lines of text served as units of analysis. These documents from observations in general education classrooms yielded 1343 lines of text. The research team began coding first by reviewing the documents, and then developing an initial coding scheme through peer negotiation.

Description of Classrooms

Students were grouped in a variety of arrangements including Whole Group, Small Group, Paired Practice, and Independent Practice. All 9 teachers utilized a minimum of 2 grouping arrangements for students during the observation. Seven of the 9 teachers used small groups during part of the instructional session, with more time spent in small groups (449 lines) than in any other arrangement. Small groups were accompanied with independent practice in 4 classes, and with whole group in one class.

Teachers managed reading instruction through combinations of strategies like questioning, prompting, giving directions, demonstration, and corrective feedback. Types of questioning strategies included direct and inferential questioning in which students responded to higher-order questions that are open-ended and require explanation.

Across grades 1 and 2, teachers relied on several types of classroom management strategies that focused on the positive aspects of student behaviors. These included redirection of students' attention, praise, and effective reminders of rules. Redirection of student behavior was the most frequently used strategy, followed by praising students by providing positive feedback. Finally, teachers made frequent use of reminding students in a timely fashion to transition to appropriate behaviors (1-2-3 Look at Me, etc.).

Teacher Implementation of Reading Activities Introduced in Professional Development

Across grades 1 and 2, students engaged in an assortment of reading activities directed by teachers, including activities focused on phonological and print awareness, oral language, word analysis, fluency, comprehension, and writing. Lines of text in parentheses throughout this section refer to the analysis of these coded documents.

Phonological and print awareness. Phonological awareness activities such as blending sounds, segmenting sounds, and alliteration tasks are developmentally appropriate for emergent readers, and were only observed in first grade and learning support classrooms (181 lines). These activities encourage students to reflect on and manipulate the sounds in spoken words. Print awareness activities were also only recorded in four classrooms with first graders. These activities encourage children to understand conventions of representing language in print, to prepare them to make the connection between print and spoken language, and to translate their ideas into print. In 2 of the first grade classrooms, teachers engaged students in shared storybook reading. In one classroom, students participated in a daily newsletter activity in which they used print as an information tool to communicate information regarding the calendar, the weather, and daily school and home-related activities. A final activity to reinforce the value of print as a tool for preserving thoughts and shared ideas was making books. Students wrote and illustrated their own books that were shared with peers during storytime.

Oral Language. Oral language activities constituted a substantial part of reading instruction (281 lines of text). Teachers promoted oral discourse by having students reconstruct narrative frameworks that specify underlying relationships of story components (i.e., characters, settings, episodes, resolutions—63 lines). Retellings were observed in 5 of 9 classrooms (134 lines). Teachers engaged students in retellings by having them relate elements of story structure in sequence. In one classroom, students were asked to assemble story strips (printed sentences) describing pertinent story events in chronological order. In 4 classrooms, teachers incorporated story grammar activities that featured discussions of story components. Students were encouraged to orally summarize story events (68 lines), make predictions (16 lines), and unpack their ideas in an effort promote literate oral discourse during reading instruction.

Word analysis. Teachers in several classrooms engaged students in analyzing words, sometimes using words students could already read, but more often teaching strategies that students could employ to decipher unknown words. The first of these strategies, observed in 3 classrooms, was phonic generalizations (27 lines). Phonic rules like the silent 'e' rule ('e' at end of a word indicates that the previous vowel is long as in the word "same") were used to encourage decoding and word acquisition. A second word analysis skill, the recognition of orthographic patterns, was a strategy observed in 2 classrooms (19 lines). Teachers employ this approach to encourage students to recognize patterns in known words and apply them to unknown words in an effort to increase word acquisition (i.e., patterns such as /ain/ found in *rain, pain, terrain*, etc.). In another classroom, students with special needs participated in word building activities to promote word acquisition (14 lines). In this particular activity, students transformed words using a vertical pattern whereby they changed specific letters of words to transform them into new words.

Comprehension. Five of 9 classroom teachers consistently activated students background knowledge during story reading to enhance understanding (81 lines). Teachers helped students relate past experiences and link them to new concepts. Teachers were able to facilitate this linkage by encouraging discussion and drawing out students' personal knowledge. Vocabulary development (definitions, discussions of word meanings) was observed in 4 of the 9 classrooms (107 lines). In 3 classrooms, teachers utilized graphic organizers as visual tools that help students categorize specific information (90 lines). By incorporating graphic organizers in reading instruction, teachers make pertinent information accessible as students retrieve this information from memory.

Writing activities. Six teachers engaged first and second-grade level students in writing activities during reading instruction. These activities ranged from simple workbook activities (40 lines) to more complex story-writing activities (92 lines). In 2 multi-grade level classrooms, teachers assigned writing activities following story presentations and fluency practice. For the most part, students worked independently in writing activities, however, one first-grade level teacher had an entire large group of

students write correct responses to her questions during a retelling using a graphic organizer. Moreover, the teacher seized this opportunity to incorporate segment-to-spell and invented spelling as means of encouraging these young readers to attempt words beyond their current writing abilities.

Fluency. During whole class and small group instruction, teachers engaged students in oral reading, silent reading, rereading, and partner reading (319 lines, total) to help students develop fluency and more automatic word recognition. Oral reading was observed in 5 of the 9 classrooms, silent reading in 6 of the 9 classrooms (followed by comprehension questions or retelling), and rereading text was observed in 2 classrooms. Partner reading (one student reads aloud as the other follows along reading silently and offering assistance as needed) was recorded in 1 only one observation, although several teachers mentioned using partner reading one or more times per week.

The Reading Development of Children Across First and Second Grades

All children in the treatment were measured at the beginning and end of first and second grade, using alternate forms of the WRMT-R and reading fluency passages. Children with standard scores more than one standard error below the mean on the WRMT-R in October were also assessed in early February of each year. Descriptive statistics that show the reading development over time for the subset of children who received additional intervention and testing (Low Achievers and children with disabilities in Layer 2) are shown in Table 1, along with scores of children who only received Layer 1 (average and good readers), and children in the control group, who were only measured at the end of Grade 2.

Student Outcomes, End of Grade 2

Multivariate analysis of variance (MANOVA) of outcomes between second graders in the two schools prior to these interventions and after receiving two years of the first and second layers of intervention was significant (Wilks' lambda (5, 172) = 0.814, $p < .05$). Univariate follow-up tests revealed that all reading outcomes differed significantly ($p < .01$), and favored children in the treated years, however, scores on receptive language (PPVT-R) did not differ.

Comparison of treated children with and without disabilities. About half of the children who received additional small group instruction in reading in first and/or second grade were referred and found eligible for special education services. Children without disabilities who received the same treatments are labeled low achievers (LA) in Table 1, which shows the reading progress of children across categories. MANOVA of end of Grade 2 outcomes between children with disabilities and LA found no significant differences in reading or language outcomes based on disability status at the end of Grade 2.

Outcomes for children with disabilities. A comparison of end-of-second grade scores for children with disabilities shows significant differences between children in the treated and control years favoring children who received two layers of intervention (Wilks' lambda (5, 17) = 0.542, $p < .05$) in all subtests of the WRMT-R/NU and in reading fluency. No difference was found in receptive language.

Rates of Placement in Special Education

In the three years prior to this research, the incidence of placement in special education averaged 15% (14.8% in the year the control group data were collected). Following two years of participation in early intervention, the rate of placement was 10.9% (< 9% with disabilities affecting reading development). Of students eligible for special education, one student had serious emotional disturbance, two had mental retardation, and seven had learning disability. Of students with learning disability, all but two children were reading in the average range (within one standard deviation of the mean) on the WRMT-R. Figure 1 shows the range of oral reading fluency scores of second graders in the treatment and control groups.

Discussion

Our goal was to increase the reading performance of children with disabilities in the project schools. The children eligible for special services by the end of this study significantly outperformed the students eligible for special education in previous years in the catchment schools. Moreover, we accomplished this goal while significantly raising the reading achievement of the students without disabilities.

The Interface between Data and Design of Instruction

The first layer of intervention had two distinct features: periodic analysis of performance data on children's progress toward reading acquisition, and professional development to increase the competence and confidence of teachers to influence reading progress. Collecting reading performance data on a routine schedule encouraged teachers to examine and discuss the trajectories of children, and to think about their growth objectively and subjectively in comparison with other children. Teachers became skilled at reading data spreadsheets and identifying the children who were making slow growth in reading. These activities interfaced with the content of professional development, because we asked teachers to reflect on the needs of particular students in their classes as we discussed implementation. We had hoped that focusing on students' literacy growth might encourage teachers to select research-based methods, and also to perpetuate the practices that appeared linked to improved reading for their students(Gersten et al., 2000). Although we used the frameworks of others (Darling-Hammond, 1997; Kennedy, 1997) for designing the flow of professional development days, the specific content of these sessions was controlled by the progress of children in essential early reading areas.

Teaching behavior and instructional routines appeared to change as a result of professional development. Prior to this study, three of the ten general education teachers reported grouping students for reading instruction within classrooms. Two years later, we observed grouping in 7 of 9 classrooms (one teacher was not observed). First grade teachers reported using activities from inservice sessions to develop phonemic blending and segmenting early in the year, prompted by discussion of blending/segmenting scores of their students in October. Over two-thirds of the first and second grade teachers reported using different levels and decodability of materials with children according to their progress on the reading measures we collected, a practice common among special education and remedial teachers, but rare in these general education classrooms prior to this project.

We saw these changes borne out during Year 2 observations as teachers implemented activities and suggestions drawn from the content of the professional development days. Teachers showed us the ways in which they individualized instruction or managed to increase reading practice time.

Teachers attempted to increase the integration of reading approaches across programs. A first grade teacher told us, "Before [this research], special ed was a totally separate thing, different methods, different materials. Now, [student name] carries his book from her class into mine, and says, 'Oh, I learned that from Ms. Z' [special education teacher], or Ms. Z tells me she shows him how pairs of letters go together and he says, 'That's just like my spelling words.'" One pair of general/special education teachers in School 2 developed a notebook kept on a shelf in the general classroom for each teacher to jot down specific aspects of literacy instruction that the other could reinforce with particular children across the school day (e.g., themes for the week, word patterns, spelling words, new vocabulary). They told us that the notebook helped them to shape coherent instruction for a child who received services from multiple sources. Many teachers used materials at similar levels of difficulty across the small group instruction in general and special education, and in Layer 2. Controlling the reading level of materials offered more redundancy for high frequency words, word patterns, and vocabulary, which Dowhower (1984; 1987) suggests leads to improved fluency and comprehension.

Although this first Layer of Intervention may have increased the participation of children with reading difficulties and the reading achievement of typical learners, additional assistance (Layer 2) was needed for 14% of students in Grade 1 (13 children, 3 diagnosed with disability prior to kindergarten), and 13% in Grade 2 (8 continuing to receive Layer 2 from Grade 1, 2 whose scores had been too high for eligibility a year earlier, and 2 who moved into the catchment schools at the end of Grade 1 or beginning of Grade 2.

Layer 2

Opportunity for children to receive targeted intervention prior to becoming eligible for special education interfaced with teachers' use of performance data. Although the data were collected by university personnel, teachers ultimately had control over how the data were used. For example, teachers determined which students should receive Layer 2, and when those services would be provided. They alerted project personnel when classroom activities (e.g., Dinosaur Day, visiting speakers) conflicted with

small group instructional times, so that instruction could be rescheduled. Most of Layer 2 was provided by research associates or doctoral students, and their schedules were more flexible than those of many special educators, whose commitments to many students and teachers make scheduling changes difficult.

The flexibility of the content and scheduling of these small groups may have been a factor in their success. As children appeared to catch up to classmates in reading, they were dropped from the Layer 2 interventions; As teachers learned new ways to teach reading and to provide appropriate practice, some teachers were able to orchestrate these opportunities without pullout assistance from project personnel. Layer 2 was not a "one size fits all" intervention. The small group activities were tailored to the needs of the two, three, or four children in the group, and as needs changed, groups were rearranged. Some groups focused on strategies for reading words children encounter in print and do not immediately know. Instruction in these groups included phonic generalizations (e.g., an 'e' on the end of a word often signals a long vowel) and orthographic patterns (e.g., -ain makes the same sound in rain, stain, and terrain) that commonly occur in written English (Adams, 1990; Gough et al., 1992).

Nevertheless, the landmark studies of first grade reading by Bond and Dykstra (1967) and Chall (1967) revealed that programs that emphasized phonics were only effective if they also included frequent, prolonged opportunities to read stories and books. Most instructional groups in Layer 2 combined word reading strategies with reading and rereading text, often at a lower level of difficulty than the reading materials used in the general classroom. Two groups of second graders focused only on building reading fluency and comprehension. Thus, in many ways the content of instruction was special education in its most ideal sense.

Literacy Levels of Students with Disabilities

Achieving levels of fluency sufficient for the development of reading comprehension can be another stumbling block for students with RD (Lovett, Steinbach, & Frijiters, 2000), even as discrete skills, such as decoding words, improve. Among the control group, for example, 23 of the 89 students read fewer than 50 words per minute in grade level text at the end of Grade 2, a rate associated with reading failure by some researchers (Good et al., in press; Dowhower, 1987). Children who participated in two years of layered interventions fared better, although 16 children still read fewer than 50 words per minute at the end of the second year (See Figure 1).

In terms of the severest reading problems, however, considerable change was achieved. All of the children across treated and control groups who read fewer than 25 words per minute also received special education services. Of these slower readers, only 2 students with disabilities in the treated group (one with mild mental retardation and one with LD) read fewer than 25 words per minute, compared with 11 children in the control group. Moreoever, two of the students on the list of 10 receiving special education at the end of Grade 2 —one with SED and one with LD in math--had a history of average to high reading performance across the two years of this study.

Rates of placement in special education. By assessing the effects and outcomes of each stage of intervention, we hoped that a decreased referral rate to special education would occur. Although the rates of placement in special education appeared to decrease, rates are not necessarily consistent in a school building from one year to the next, therefore, we are not confident that this decrease is a result of the early intervention provided through this project.

We were encouraged with the reading progress of children with disabilities, however, children reading near the average range were still referred to special education during second grade. One possible reason for these "nearly normal" referrals was the discrepancy between the reading performance of children eventually labeled with disabilities, and the average reading achievement of children in their classrooms. When we examined the spread of scores in second grade during the treatment and control years, this possibility warranted attention. Although scores of the top 25% of students across years appears to be about the same, the scores of "average" children rose about a half standard deviation. Children diagnosed with reading disability in Grade 2 ended that year with composite standard scores of 93, on average. Children who did not need that second layer of intervention ended the year with standard scores averaging 112. Thus, children diagnosed as RD were approximately 1.3 SD's below the mean of

their peers, which is about the same difference between children with and without RD in the Control group.

Another possibility is that children were referred to special education for reasons other than their reading achievement. Three of the 10 children with disabilities had already been diagnosed prior to entry in first grade (one with pervasive developmental disorder, one with mild mental retardation, and one with emotional disturbance). The incidence of disabilities other than RD remained about the same across the years of this study. In addition, improving reading ability may not impact other academic and social areas affected by disability.

Implications

The instruction we have begun incorporates theoretical and practical considerations in reading development and measurement. The model of layered interventions we have described could help to accommodate children who struggle with reading acquisition, and to exhaust general education alternatives before a student is referred for costly special education services (Fuchs & Fuchs, 1998; Gottlieb, Alter, Gottlieb, & Wisher, 1994). By first teaching children in whole group lessons, then intervening in smaller groups, and then--only when necessary--with pullout instruction, we implemented a technique feasible in general and special education settings. These layers of intervention comply with recent IDEA legislation by increasing the appropriateness of general education as a placement for children with RD, and to determine when such placement is appropriate. Some of the second graders with disabilities are now reading in the normal range. But as reading becomes more complex, we will need to tightly orchestrate instructional opportunities to allow these children to continue a normal trajectory of literacy growth.

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Table 1
Means and Standard Deviations for Treated and Untreated Children in Grades 1 and 2

	Layers of Intervention (1998-2000), N = 92				Control (1999), N = 89
	Grade 1		Grade 2		Grade 2
	October	May	October	May	May
Letter Names	57.25 (15.07)	66.95 (17.33)			
Blend	16.12 (3.73)	19.56 (2.48)			
Segment	23.26 (9.65)	38.58 (13.10)			
WRMT-R/NU					
Word Identification	102.52 (11.88)	107.76 (13.47)	105.98 (12.49)	109.91 (11.61)	102.10 (12.36)
Word Attack	101.48 (13.82)	110.63 (11.48)	106.47 (13.95)	113.26 (13.92)	102.14 (13.11)
Passage Comp	98.79 (12.12)	104.87 (11.52)	104.96 (11.96)	107.49 (9.49)	100.80 (11.64)
Reading Fluency		67.59 (34.99)	71.22 (40.98)	94.63 (40.72)	75.50 (40.29)
PPVT-R		102.41 (13.60)		104.48 (13.09)	104.42 (10.24)

Table 2
Descriptive Statistics for Experimental and Control Children by Achievement Status (Average, Low Achiever, Special Education)

	Prereading			WRMT-R/NU				
	Letter Names	Blend	Segment	Word Id	Word Attack	Passage Comp	Fluency	PPVT-R
Gr 1Oct								
Avg	61.69 (13.41)	18.57 (2.86)	25.75 (8.16)	110.22 (10.29)	108.49 (11.67)	103.02 (9.76)		
LA	42.02 (11.79)	9.30 (1.06)	12.70 (5.72)	96.70 (11.85)	97.10 (10.75)	92.40 (10.68)		
SpEd	30.20 (13.32)	6.80 (3.80)	9.10 (8.93)	91.80 (14.16)	83.00 (13.45)	84.40 (11.63)		
May								
Avg				114.45 (11.17)	116.93 (12.46)	111.36 (9.31)	82.55 (27.10)	104.74 (13.78)
LA	52.75 (3.78)	19.67 (2.39)	42.44 (7.14)	101.00 (8.94)	103.70 (8.14)	99.40 (7.14)	29.70 (9.50)	98.30 (12.07)
SpEd	49.33 (4.93)	19.11 (2.32)	29.44 (14.37)	99.67 (12.77)	103.78 (9.12)	93.78 (9.95)	20.89 (17.94)	94.22 (12.24)
Gr 2 Oct								
Avg	72.00 (16.04)	20.76 (2.82)	38.82 (12.08)	108.43 (10.40)	107.23 (11.08)	108.18 (10.88)	89.95 (31.95)	
LA	53.92 (13.41)	20.67 (2.96)	36.25 (10.19)	95.42 (9.67)	96.08 (13.62)	94.67 (11.52)	34.45 (15.02)	
SpEd	53.40 (13.86)	19.40 (3.37)	32.33 (10.65)	91.70 (13.36)	89.60 (17.96)	95.25 (8.94)	28.20 (29.33)	
May								
Avg				112.46 (10.49)	115.13 (13.09)	109.56 (8.59)	107.15 (35.99)	103.02 (10.30)
LA				102.33 (7.24)	106.00 (12.17)	101.67 (7.50)	60.25 (21.14)	98.25 (11.27)
SpEd				98.10 (12.97)	103.60 (16.75)	96.30 (10.33)	45.40 (19.14)	95.00 (11.80)
Control : Gr 2 May								
Avg				105.53 (9.46)	105.03 (11.60)	104.00 (8.72)	84.64 (36.30)	105.97 (9.23)
SpEd				82.31 (7.53)	85.46 (7.89)	82.30 (8.86)	22.77 (10.38)	95.46 (11.56)

Children Who Read Poorly (Fluency < 50 words per minute)